

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
24 December 2003 (24.12.2003)

PCT

(10) International Publication Number
WO 03/107653 A1

- (51) International Patent Classification⁷: **H04N 1/32**
- (21) International Application Number: PCT/IB03/02569
- (22) International Filing Date: 11 June 2003 (11.06.2003)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
02077459.2 17 June 2002 (17.06.2002) EP
- (71) Applicant (for all designated States except US): **KONINKLIJKE PHILIPS ELECTRONICS N.V.** [NL/NL]; Groenewoudseweg 1, NL-5621 BA Eindhoven (NL).
- (72) Inventors; and
- (75) Inventors/Applicants (for US only): **KALKER, Antonius, A., C., M.** [NL/NL]; c/o Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL). **WILLEMS, Franciscus, M., J.** [NL/NL]; c/o Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL).
- (74) Agent: **SCHMITZ, Herman, J., R.**; Philips Intellectual Property & Standards, Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL).

(81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

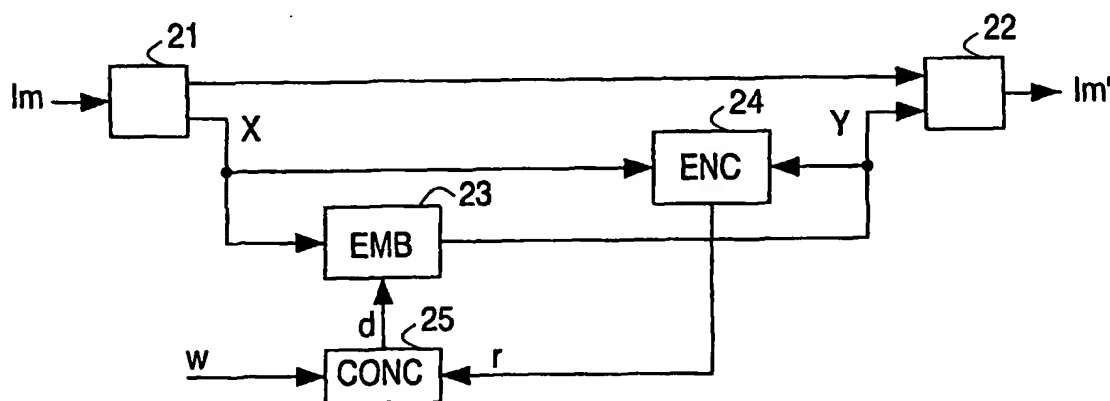
(84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— with international search report

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: LOSSLESS DATA EMBEDDING



(57) Abstract: An undesirable side effect of watermarking or data-hiding schemes is that the host signal is distorted. This invention discloses a reversible or lossless data-hiding scheme, which allows complete and blind (without additional signaling) reconstruction of the host signal (X). This is achieved by accommodating, in the embedded data (d) of the watermarked signal (Y), restoration data (r) that identifies the host signal, given the composite signal, i.e. the restoration data identifies (24) which modifications the host signal has undergone during embedding (23). The restoration data is accommodated in a portion of the embedding capacity of a conventional embedder (23). The remainder of the capacity is used for embedding payload (w).

WO 03/107653 A1

INTERNATIONAL SEARCH REPORT

Intern application No
PCT/IB 03/02569**A. CLASSIFICATION OF SUBJECT MATTER**
IPC 7 H04N1/32

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHEDMinimum documentation searched (classification system followed by classification symbols)
IPC 7 H04N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the International search (name of data base and, where practical, search terms used)
EPO-Internal**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	J. FRIDRICH, M. GOLJAN, R. DU: "Lossless Data Embedding New Paradigm in Digital Watermarking"	1,6,7, 10,11
A	SPECIAL ISSUE ON EMERGING APPLICATIONS OF MULTIMEDIA DATA HIDING, vol. 2002, no. 2, February 2002 (2002-02), pages 185-196, XP002254473 the whole document	2-5,8,9
A	US 6 278 791 B1 (HONSINGER CHRIS W ET AL) 21 August 2001 (2001-08-21) abstract	1-11

☐ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

* Special categories of cited documents:

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

- *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- *Z* document member of the same patent family

Date of the actual completion of the international search

15 September 2003

Date of mailing of the international search report

26/09/2003

Name and mailing address of the ISA
European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Azaustre Maleno, V

INTERNATIONAL SEARCH REPORT

Intern application No
PCT/IB 03/02569

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 6278791	B1	21-08-2001	NONE